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Title: Many-Body Factorization & Position-Momentum Equivalence of SRC

Author(s): Lonardonì, Diego

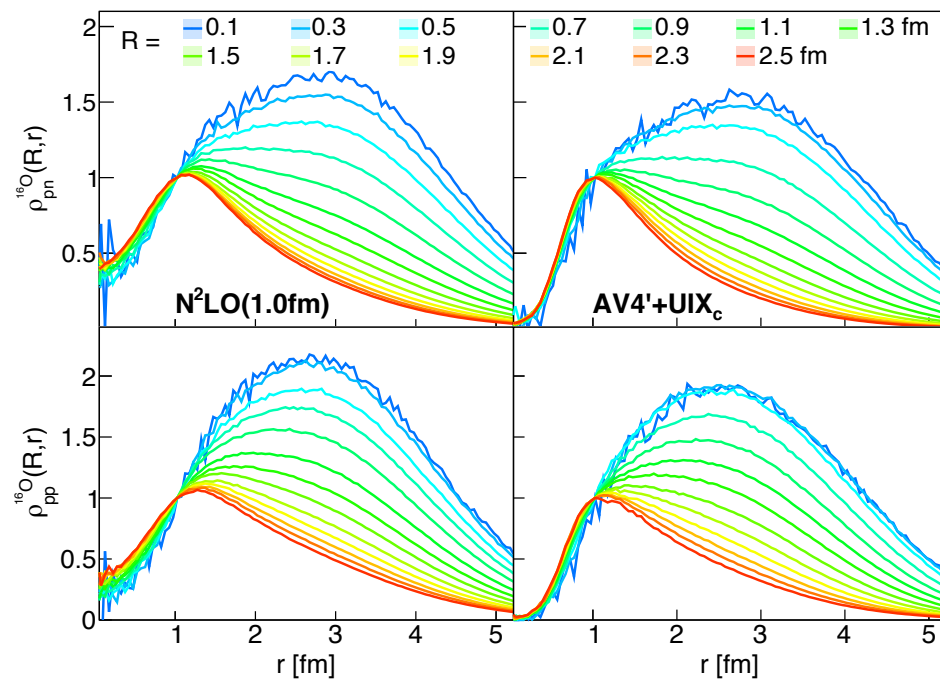
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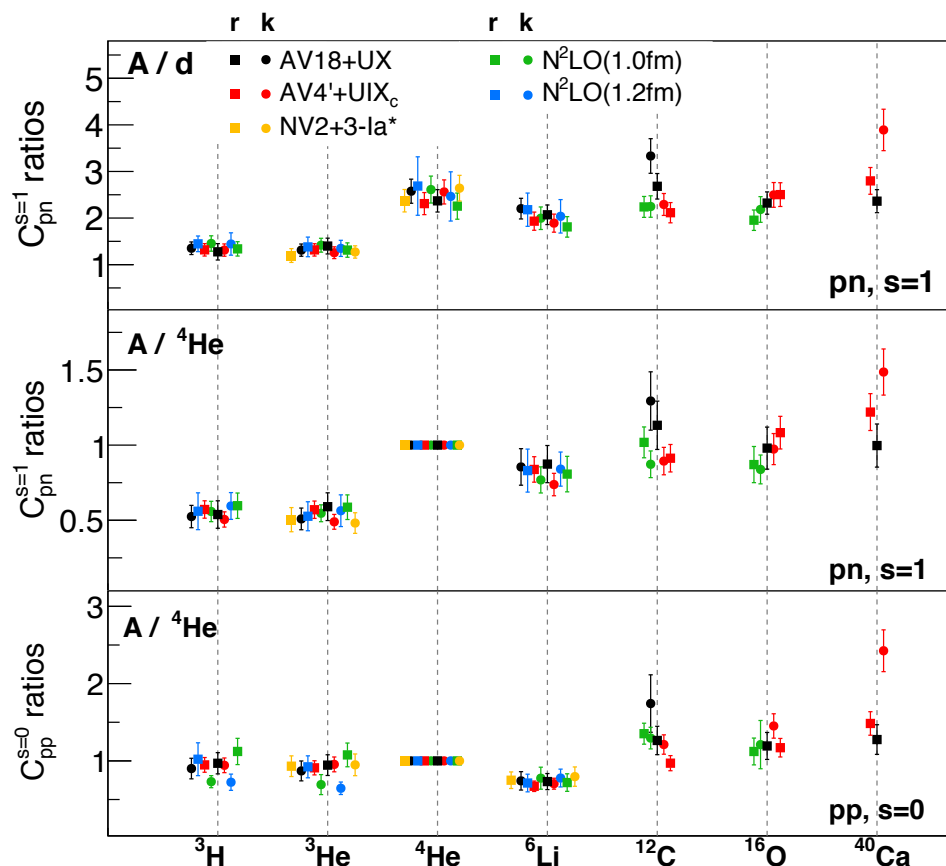
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Many-Body Factorization & Position-Momentum Equivalence of SRC



QMC scaled two-body coordinate-space densities in ^{16}O .



pn and pp nuclear contact ratios for nuclei A/d and $A/{}^4\text{He}$.

Objectives

- We study short-range correlations (SRC) using the generalized contact formalism (GCF) and quantum Monte Carlo (QMC) calculations of nuclei from deuteron to ^{40}Ca .
- We employ different realistic nuclear interactions and extract spin/isospin-dependent nuclear contacts in both coordinate and momentum space.

Impact

- We observe a universal factorization of the nuclear many-body wave function at short distance into a strongly interacting pair and a weakly interacting residual system, the latter consistent with that of an uncorrelated system.
- Nuclear contacts are the same in r - and k -space, and contact ratios between two different nuclei shows very little dependence on the nuclear interaction model.
- Conclusions: 1. SRC effects are predominantly embedded in two-body correlations. 2. The relative abundance of short-range pairs in a nucleus is a long-range (*i.e.* mean field) quantity that is insensitive to the short-distance nature of the nuclear force.

Accomplishments

- R. Cruz-Torres, D. Lonardoni *et al.*, [Nat. Phys. \(2020\)](#)
- M. Urban, [Nat. Phys. News & Views](#)
- J. Chu, [Phys.org](#)